REMARKS

The rejection of Claims 1-16 under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over, U.S. 5,424,256 (Yoshimura et al '256) or U.S. 5,369,065 (Yoshimura et al '065), is respectfully traversed. (The term "Yoshimura et al" is used below when applicable to either Yoshimura et al '256 or Yoshimura et al '065).

As recited in above-amended Claim 1, the invention is a wear resistant member, comprising: a silicon nitride sintered body including from 75 to 97% by mass of silicon nitride, from 0.2 to 5% by mass of particles of titanium nitride and from 2 to 20% by mass of a grain boundary phase comprising a Si-R-Al-O-N compound, where R is a rare earth element; wherein the particles of titanium nitride have a long axis of 0.04 μm or more and 1 μm or less, and at least 80% by volume of the particles of titanium nitride have an aspect ratio in the range of from 1.0 to 1.2.

The present invention relates to a silicon nitride based wear resistant member excellent in sliding characteristics, in particular rolling fatigue life. The titanium nitride particles exist mainly in the grain boundary phase of the silicon nitride sintered body, thereby reinforcing the grain boundary phase to contribute to an improvement in sliding characteristics, in particular rolling fatigue life of the silicon nitride sintered body.

However, when the particle diameter of the titanium nitride particles is large, or the titanium nitride particles a have a distorted form, the sliding characteristics of the silicon nitride sintered body decline. In particular, the form of the titanium nitride particles affects the rolling fatigue life of the silicon nitride sintered body.

In the present invention, the titanium nitride particles have a long axis of 0.04 μm or more and 1 μm or less. When the long axis of the titanium nitride particles exceeds 1 μm, the sliding characteristics of the silicon nitride sintered body deteriorate. But the sliding characteristics cannot be improved if the long axis of the titanium nitride particles is too

small. As shown in Tables 4 and 5 of the specification, the titanium nitride particles having a long axis in the range of from 0.04 to 1 μm contribute to improvement of the sliding characteristics.

Furthermore, at least 80% by volume of the titanium nitride particles have an aspect ratio in the range of from 1.0 to 1.2. The aspect ratio defines a ratio of long axis to short axis. When the ratio of slim particles of which aspect ratio is more than 1.2 exceeds 20% by volume, anisotropy and fluctuation in the reinforcement of the grain boundary phase occur. Thereby, the rolling fatigue life of the silicon nitride sintered body deteriorates.

When the titanium nitride particles have an aspect ratio in the range of from 1.0 to 1.2, the grain boundary phase can be uniformly reinforced and sliding shock can be effectively relieved. Therefore, the sliding performance such as rolling fatigue life can be markedly improved.

Yoshimura et al '256 discloses a silicon nitride sintered body comprising dispersed particles of, for example, titanium nitride, having an average particle size of 0.1 μm or less (column 4, lines 64-66). Yoshimura et al '065 discloses a silicon nitride sintered body comprising titanium compound particles, such as titanium nitride particles, which appear to have an average size of 300 nm or less. However, Yoshimura et al do not disclose the form of their respective titanium nitride particles. Yoshimura et al neither disclose nor suggest that at least 80% by volume of their titanium nitride particles have an aspect ratio in the range of from 1.0 to 1.2, as recited in Claim 1. Nor does Yoshimura et al recognize the improvement in rolling fatigue life of the silicon nitride sintered body when operating within this aspect ratio, as detailed in the comparative data of record. Indeed, Yoshimura et al disclosed nothing with regard to improving rolling fatigue life. Rather, Yoshimura et al are concerned primarilywith strength and fracture toughness. Note further that the present claims now require a minimum long axis of 0.04 μm for the recited particles of titanium nitride. This

value is above the 0.03 μm maximum preferred by Yoshimura et al '256, as reflected in Claim 2 therein. The presently-recited 0.04 μm minimum is above the maximum average particle size of 300 nm of Yoshimura et al '065. Finally, Yoshimura et al could not have predicted the improved results for the presently-claimed invention, as supported by the comparative data of record.

For all the above reasons, it is respectfully requested that the above rejections be withdrawn.

All of the presently pending claims in this application are now believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

Respectfully submitted,

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